Mangrove Dodge

Video: Everglades Mountains and Valleys- Chap 7 "Mangrove"

Subject: Science, Math, Physical Education

Duration: 1-2 hours or class periods

Group Size: 25-30 (adjustable)

Setting: Outdoor play area or gymnasium

Grade: 4-5

Standards:

Common Core: MACC.K12.MP.1, MACC.K12.MP.2, MACC.K12.MP.3, MACC.5.MD.2.2

NGSSS: PE.4.M.1.1, PE.4.M.1.2, PE.4.M.1.8, PE.4.C.1.2, PE.4.C.1.6, PE.4.L.1.1, PE.4.L.1.2, PE.5.M.1.1, PE.5.M.1.7, PE.5.M.1.8, PE.5.L.1.1, PE.5.L.1.2, MA.5.S.7.1, SC.4.N.1.1, SC.4.E.6.4, SC.4.L.17.4, SC.5.N.1.1

Vocabulary: Red mangrove, coastline, erosion

Objective(s)

Guiding Question: Do mangroves protect our coastlines from erosion?

Critical Content: Learn how the number of mangroves growing on a coastline will directly affect the amount of coastal erosion.

Student Objectives: Students will…

Materials

- Paper (Graph or Lined)
- Pencil
- 10-15 Rubber Balls
- Stop Watch or Timer

- Learn about the mangrove habitat and its benefits to the environment.
- Learn the correlation between the number of mangroves and the amount of coastal erosion.
- Develop data tables and line graphs to support the above referenced correlation.

Method Using an outdoor game, students will simulate the coastal mangrove environment. They will witness the effects of such factors as mangrove elimination, construction, and hurricanes on the rate of erosion. Data will be measured and recorded on tables and graphs for further evaluation and discussion.

Background The mangrove forest is an intra-tidal habitat located in brackish water (where fresh water meets with salt water). Mangroves serve several important functions in the Everglades environment, such as protecting coastlines from erosion, filtering out pollutants from the fresh water flow, providing an important nursery for juvenile marine and avian wildlife, and due to its leaf "litter", acting as a primary source in the food chain. Much of the mangrove forest has been destroyed due to construction and clearing away, which has significantly contributed to coastal erosion.

Suggested Procedures

- Show students "Mangrove" Chapter 7 of the "Everglades Mountains and Valleys" Video
- Review with students the importance of mangrove forests for the protection of our coastlines. Discuss what might be affecting the health of the mangrove forest in the Everglades.
- Bring students to an open area to play "Mangrove Dodge Ball". Line students up according to the diagram below (x=player):

	X X	X
X	X X	X X
X	X X	X X X
X	X X	X X
	X X	X X
Ocean	**Red Mangroves**	**Coastline**

- **Ocean**: Players on the "ocean" line will be provided with rubber balls and instructed to throw the balls through the "mangrove" forests in an attempt to hit the players in the "coastline" area. They will be given three minutes for each game session. "Ocean" players need to be reminded to not aim the balls above the waist of any other player. If that rule is broken, they will be eliminated due to

"drought". Have two extra students standing to the side to be added to the "ocean" team later, and 1-2 students to catch balls behind the "coastline" area and return them to the "ocean".

- **Mangroves**: These players must stay in place and link arms. They may kick the ball back towards the "ocean" to block it from reaching the 'coastline". The may also use their arms as long as they remain linked in some way.

- **Coastline**: These players consist of the remainder of the group, and can be spread out in any formation, as long as they stay in one place throughout the game. They can move their torso to avoid the ball, however they cannot move their feet. Also, their arms must remain crossed over their chest. Once a "coastline" player is touched with a ball from the "ocean", they are eliminated from the game and must stand on the side.

- **Session 1**: In the first session three minute session, two lines of "mangrove" players remain intact demonstrating a healthy mangrove forest on a coast line. As the "ocean" players throw the balls representing water, students should see that it is more difficult to eliminate coastal areas with the mangroves present.

- After three minutes, students will record on a table the number of "ocean" players, "mangrove" players, and the remaining number of "coastline" players.

- **Session 2**: Add the two extra "ocean" players, and for the next 3 minute session, tell the students that a hurricane has hit the coastline. Again record the number of "ocean" players, "mangrove" players, and the remaining number of "coastline" players.

- **Session 3**: In the next session, eliminate the second row of the "mangrove" players, and the extra two "ocean" players. Tell the students that the hurricane is over, but the mangroves have been removed due to the construction of a video game store and a yogurt shop. After recording the data from this session, the students should be able to see an increase in the amount of coastline destroyed due to the destruction of the mangrove forest. Depending on time available and the number of students, you can create additional play sessions and scenarios that gradually eliminate most of the forest by any man-made activity you choose. The results of each period of play should be noted in the data table.

- **Session 4**: In the final session, all the mangrove players are eliminated due to poor water quality and/or construction, leaving only the "ocean" and "coastline". Without the mangrove's protective presence, students will witness how quickly the coastline is affected. You may also want to create another "hurricane", and record the results.

- **Wrap Up**: Students will use the data from the tables and create line graphs to demonstrate the effect the number of mangroves has on maintaining our coastline. Students could also demonstrate this effect by using ratios.

- **Data Table Example**

Session # and notes	Ocean Players	Mangrove Players	Remaining Coastline Players after 3 mins.
1- Healthy Mangrove Forest. All Players	3	12	Record data here.
2- Hurricane. Add'l ocean players added	5	12	Record data here.
3- Second row of mangroves eliminated due to construction.	3	6	Record data here.
4- All mangroves eliminated due to poor water quality.	3	0	Record data here.
5- Add'l ocean players added due to hurricane.	5	0	Record data here.

Evaluation

Discuss the activity and data results with the students and ask how the exercise correlates to what might be actually happening to the mangrove forests.

- How was the "mangrove" line in the game similar to an actual mangrove forest? How was it different? What other types of mangroves are present in the forest?
- How do mangroves help to prevent coastal erosion?
- What are humans doing to harm the mangrove forest?
- How can we help to maintain it?
- What are some other natural hazards to mangroves?

- Why are mangroves so important during hurricane season?
- Name three other benefits of the mangrove forest besides preventing coastal erosion.

Extension

- Visit the mangrove forest in Everglades National Park. Identify the different species of mangrove trees and explore how the species are "layered" along the coastline. Ask a park staff member to show you a healthy forest and discuss what challenges the mangroves face in the Everglades (both natural and man-made).
- Students can research what rules and/or laws are in currently in place to protect mangroves in Florida.
- Have students participate in a project to grow mangrove propagules to be donated to coastal areas where they are needed.